Space Weather Forecast

Issued on Friday, 12 January 2024 at 12:08 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Daily chance of Moderate-class X-ray flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been moderate over the past 24 hours, with occasional low-level Moderate-class X-ray flares. The largest of these was observed at 11/1752UTC from the northwest, however the bulk of these larger flares were from an active region on the northwestern solar horizon.

There are now up to eleven sunspot regions on the facing side of the Sun, including up to four new eastern solar hemisphere groups - as two more faded from view near the western solar horizon.

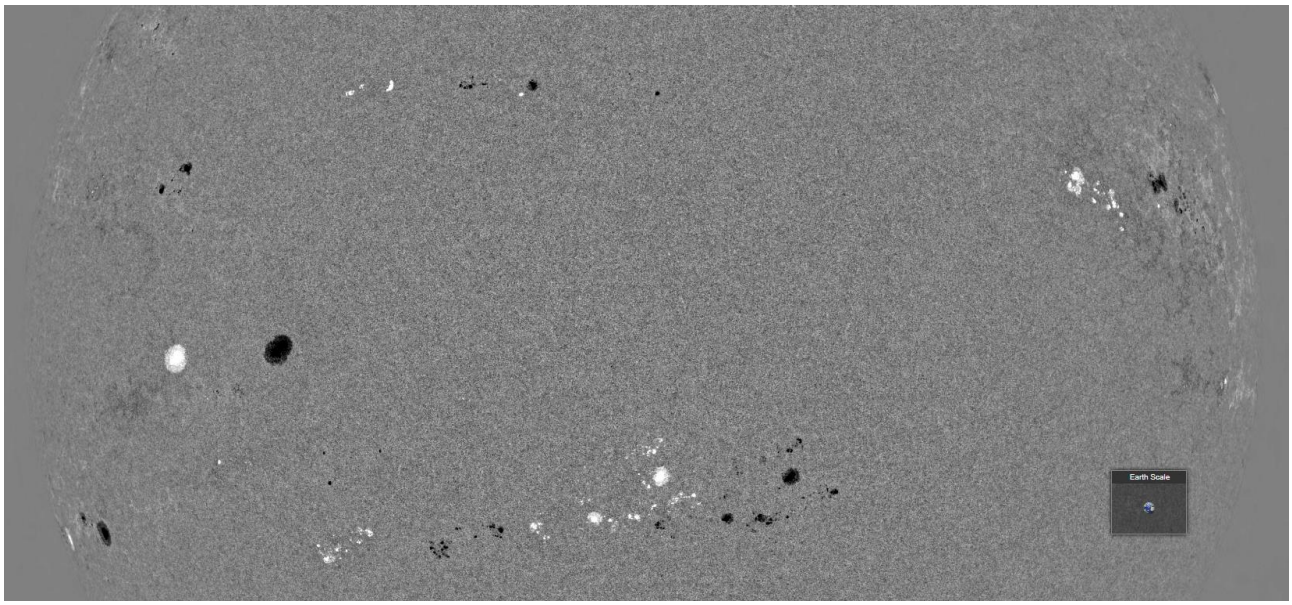

Figure 1: Helioviewer.org-processed 24-hour difference in visible light footprint to 12/1145UTC, showing the main changes in all front-sided sunspot groups in the period (white evolving to black). Perhaps most significant is a group in the upper right in terms of activity, however the series crossing the south-centre warrant monitoring attention. Earth shown for scale lower right.

Current sunspot regions are well-spread across the facing side, however perhaps the most complex and changed region in the period was near the south-centre, which forms a close pairing with another group to its immediate east, which complicates how these groups are sub-divided. Treated as a pair, there was proliferation and spreading in the southwestern-most spots.
There were a few potential Coronal Mass Ejection (CME) progenitors in the period - chronologically these were: a high northeast 'filament eruption' (arc of plasma) around 11/1230UTC; a narrow flare-associated eruption from the western solar hemisphere at

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11/1900UTC; a large 'prominence' leaving the eastern solar horizon at 12/0300UTC; and a very similar narrow CME from the west at 12/1000UTC. None of these events are currently thought to carry trajectories intersecting the Sun-Earth line, and there was therefore no evidence of any new Earth-bound CMEs.

Solar Wind / Geomagnetic Activity: Solar winds on average showed a slightly elevated character that has been ongoing since the UTC day of 08 January. The cause of this slight enhancement is not immediately clear, however the drawn-out and muted behaviour perhaps suggests a drawn-out far south coronal hole fast wind may be a possible culprit. Whatever the cause, this feature terminated with a Solar Sector boundary Crossing (SSBC) at 12/0630UTC to little geomagnetic fanfare.

The solar wind speed was slightly elevated, with the number of particles in the wind and their associated magnetic field both unremarkable and within background levels. The net result of these solar wind measures was for provisionally quiet geomagnetic activity throughout.
Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily chance of further Moderate-class activity, and a slight chance of Strong-class, declining slightly with the departure of recent more active regions.

Solar Wind / Geomagnetic Activity: No fast winds feature in the forecast period, and geomagnetic activity may therefore remain quiet throughout. The greatest chance of departures from this state of affairs is a possible glancing blow from a CME that left the Sun on 09 Jan as southeastern filament eruption. This is the rationale for the slight chance of Minor Geomagnetic Storm G1 in the UTC day of Saturday 13 January on an otherwise quiet forecast.

Energetic Particles / Solar Radiation: The risk of solar radiation storms has now reverted to near recent background levels, with a daily slight chance of seeing increases to S1 minor solar radiation storm threshold given any notable X-ray flares.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	50	50	45	45
Very Active	R3 to R5 X	No	5	5	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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